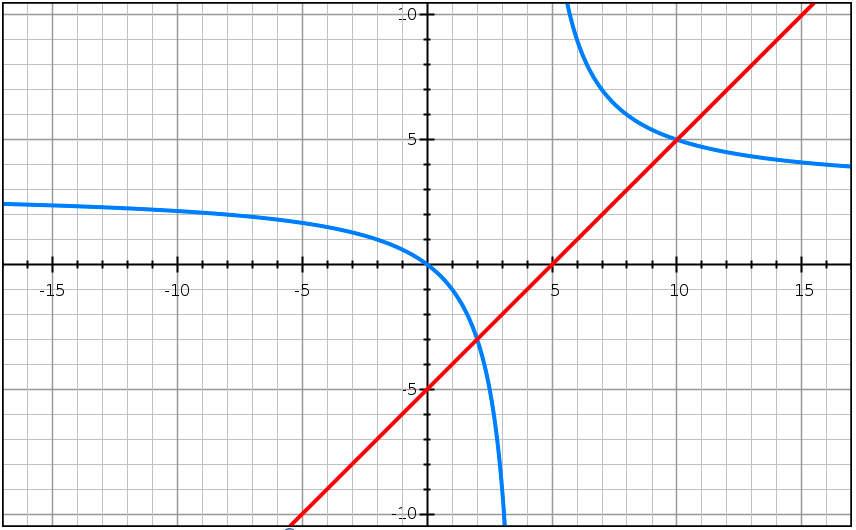
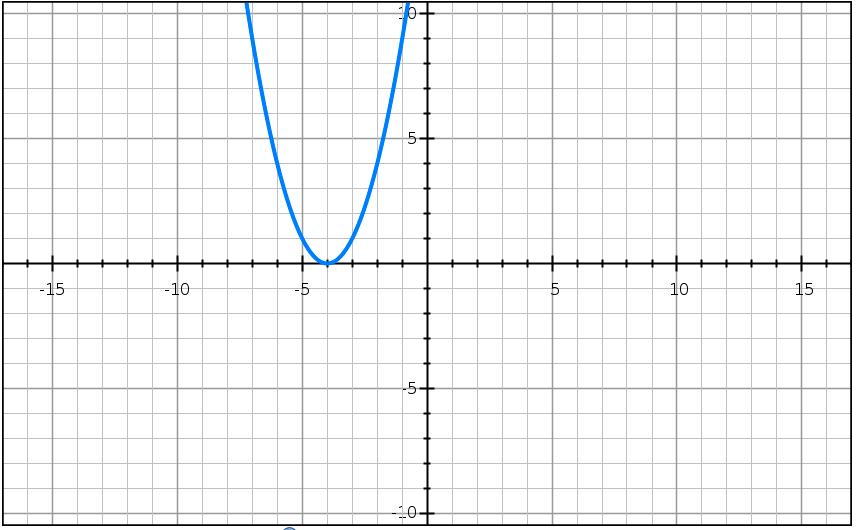
**Directions:**

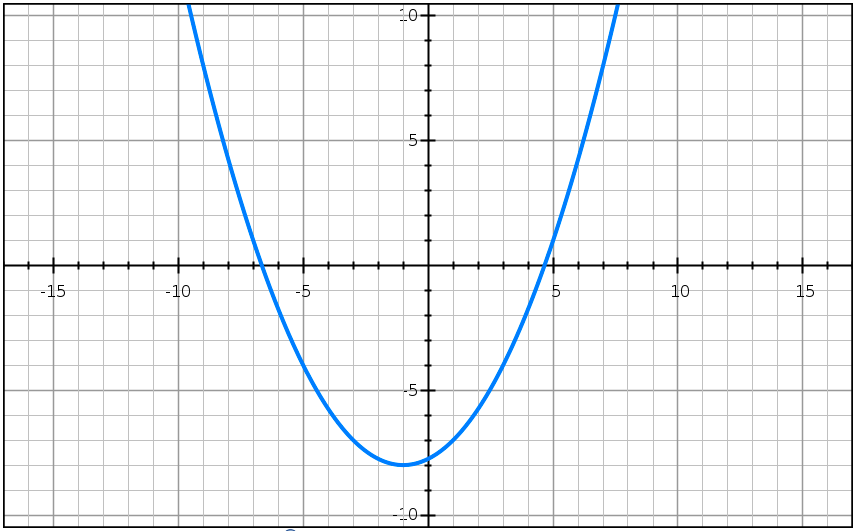
Solve each problem as asked. **Read** the question and **answer** the question asked. **Show all of your work.** Any work shown for multiple-choice questions can earn you partial credit for that problem if I understand how you arrived at your answer.

Please **box your answer** for each problem.

1. Look at the graph below.
   1. Find the equation of the two functions below. (4pts each)  
        
      
   2. Then find the **solutions to the system of the two equations**. You must **show how you arrived at your solution algebraically** in order to earn credit for this question. (5pts)
2. Is the function below odd, even, or neither? Tell how you know that this is true. (2pts)  
   
3. Find the equation of the polynomial with zeroes at and (2pts)

1. Bacteria in a petri dish increase by 45% every hour. At the start of the experiment, the researchers have 20 bacteria cells.  
   1. Write an equation to model this situation. (4pts)
   2. If this process continues, how many bacteria will there be by the 12th hour? (2pts)
   3. If this process continues, what is the **total number** of bacteria cells that will have grown by the end of the 12th hour? (4pts)
   4. Let *h* = the number of hours, and *b* = the number of bacteria. Write an equation to find *h* in terms of *b*. Use the form *b* = . (4pts)
   5. After how many hours will there be 2000 bacteria? You must show this in terms of the equation you wrote in order to get full credit. You may round to the nearest hundredth of an hour. (2pts)
2. Solve each equation below: (3pts each)
3. Simplify (2pts)

1. The following problems are not exactly what the ones on your test will be, but there will be a series of questions about quadratic functions.  
   1. Prove that the y-value of the vertex of a quadratic function is . Show your work. (2pts)
   2. How can you determine from an equation if a quadratic function will have real or imaginary zeroes? (3pts)
   3. Which of the coefficients or constants in a quadratic function **cannot** be zero: a, b, or c? Why? (2pts)

1. The figure shows a graph of the function *f(x)* in the coordinate plane.  
     
   A second function *g*, is defined by .  
   1. Which is greater, *f*(2) or *g*(2)? (2pts)
   2. Which is greater, *f*(0) or *g*(0)? (2pts)
2. Multiply (4 – 3*i*)(6 + *i*) (2pts)
   1. Multiply (4 – 3*i*)(6 + *i*)
   2. Find the equation of the quadratic function that has a zero at 3+2*i*.
3. Simplify 813/4 (2pts)

1. Expand by using the properties of logarithms to rewrite the following expressions as a sum: (2pts)
2. Condense the following expression: (2pts)  
     
   3 log5*x* + 4log5*z*
3. 1. Graph (3pts)  
      
   2. What is an asymptote? Tell what it is, not where they are on this graph. (3pts)
   3. Which part of the rational function controls the vertical asymptote?
   4. Suppose you try to solve, in the context of this problem. What is the name of the point you have found? Why is in important? (2pts)
4. Simplify. Make sure to state any restrictions on the variables. (3pts)
5. Simplify. Make sure to state any restrictions on the variables. (3pts)